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Environmental Health Sciences

Associations between air temperature and cardio-respiratory mortality in the urban area of Beijing, China: A time-series analysis

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Abstract:

Background: Associations between air temperature and mortality have been consistently observed in Europe and the United States; however, there is a lack of studies for Asian countries. Our study investigated the association between air temperature and cardio-respiratory mortality in the urban area of Beijing, China. Methods: Death counts for cardiovascular and respiratory diseases for adult residents (≥15 years), meteorological parameters and concentrations of particulate air pollution were obtained from January 2003 to August 2005. The effects of two-day and 15-day average temperatures were estimated by Poisson regression models, controlling for time trend, relative humidity and other confounders if necessary. Effects were explored for warm (April to September) and cold periods (October to March) separately. The lagged effects of daily temperature were investigated by polynomial distributed lag (PDL) models. Results: We observed a J-shaped exposure-response function only for 15-day average temperature and respiratory mortality in the warm period, with 21.3°C as the threshold temperature. All other exposure-response functions could be considered as linear. In the warm period, a 5°C increase of two-day average temperature was associated with a RR of 1.098 (95% confidence interval (95%CI): 1.057-1.140) for cardiovascular and 1.134 (95%CI: 1.050-1.224) for respiratory mortality; a 5°C decrease of 15-day average temperature was associated with a RR of 1.040 (95%CI: 0.990-1.093) for cardiovascular mortality. In the cold period, a 5°C increase of two-day average temperature was associated with a RR of 1.149 (95%CI: 1.078-1.224) for respiratory mortality; a 5°C decrease of 15-day average temperature was associated with a RR of 1.057 (95%CI: 1.022-1.094) for cardiovascular mortality. The effects remained robust after considering particles as additional confounders. Conclusions: Both increases and decreases in air temperature are associated with an increased risk of cardiovascular mortality. The effects of heat were immediate while the ones of cold became predominant with longer time lags. Increases in air temperature are also associated with an immediate increased risk of respiratory mortality.

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Resource Description

Exposure : ⊠

weather or climate related pathway by which climate change affects health

 Meteorological Factors, Temperature

   Temperature: Extreme Cold, Extreme Heat

□

Geographic Feature: ☒

resource focuses on specific type of geography

 None or Unspecified

Geographic Location: ☒

resource focuses on specific location

 Non-United States

   Non-United States: Asia

     Asian Region/Country: China

Health Impact: ☒

specification of health effect or disease related to climate change exposure

 Cardiovascular Effect, Injury

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

 Adaptation

Population of Concern: A focus of content

Population of Concern: ☒

populations at particular risk or vulnerability to climate change impacts

 Elderly

Resource Type: ☒

format or standard characteristic of resource

 Research Article

Timescale: ☒

time period studied

 Time Scale Unspecified

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

 A focus of content